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**D E C I S I O N**  
of 3 July 2002

**Case Number:** T 0909/96 - 3.3.5

**Application Number:** 88303875.4

**Publication Number:** 0289325

**IPC:** C03C 17/34

**Language of the proceedings:** EN

**Title of invention:**

Method of increasing the dynamical strength of glass container

**Patentee:**

DAINIPPON INK AND CHEMICALS, INC., et al

**Opponent:**

Ensign Bickford Coatings Company / Emprice LLC

**Headword:**

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**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (no) "

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0909/96 - 3.3.5

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.5  
of 3 July 2002

**Appellant:**  
(Proprietor of the patent)

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**Respondent:**  
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**Decision under appeal:**

Decision of the Opposition Division of the  
European Patent Office posted 31 July 1996  
revoking European patent No. 0 289 325 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** R. K. Spangenberg  
**Members:** M. M. Eberhard  
M. B. Günzel

## Summary of Facts and Submissions

I. European patent No. 289 325 based on application No. 88 303 875.4 was granted with twelve claims. The respondent (opponent) consisting of two legal persons who filed the notice of opposition in common, requested revocation of the patent on the basis of lack of novelty and lack of inventive step. The respondent relied inter alia on the following documents:

D1: English translation of JP-A-50 50182

D2: Chemtech, 12/1977; pages 766-778

D5: US-A-4 099 837

The opposition division decided to revoke the patent. The opposition division held that the subject-matter of claim 1 filed with the letter of 31 January 1995 did not involve an inventive step. D1 was concerned with the same technical problem as the patent in suit. Disclaiming the silane coupling agents disclosed in D1 could not render the claimed subject-matter inventive. The improvement in bonding strength shown in the Experimental Report filed with the letter of 31 January 1995 would have been expected by the skilled person. Moreover, the single experiment with a particular silane did not make it plausible that every other possible silane coupling agent would perform better than those of D1.

II. The appellant lodged an appeal against this decision and filed two amended set of claims with the grounds of appeal, as a main request and a first auxiliary request, as well as a further experimental report. In a communication from the board the parties were informed that the proceedings were to be suspended until the

Enlarged board of appeal had decided the question at issue in G 3/99. With a letter dated 30 May 2002 the appellant withdrew the main request and made the first auxiliary filed with the grounds of appeal (letter dated 4 December 1996) its main and sole request. Claim 1 thereof reads as follows:

"1. A method of increasing the pressure-resistant strength and impact strength of a glass container, which comprises applying a coating material comprising a reactive compound having at least two fluoroacryloyl, methacryloyl or acryloyl groups, which may be the same or different, in its molecule to the glass container, either together with a silane coupling agent or after treatment of the surface of the glass container with a silane coupling agent, heating the silane coupling agent and/or the coating material at a temperature of 40 to 120°C for 10 seconds to 1 hour, and curing the coating material by irradiation, with the proviso that the silane coupling agent is not  $\gamma$ -glycidyoxypropyltrimethoxysilane."

Oral proceedings were held on 3 July 2002.

- III. The appellant requested, as the sole request, that the decision under appeal be set aside and that the patent be maintained with the claims according to the auxiliary request filed with the letter dated 4 December 1996. The respondent requested that the appeal be dismissed.
- IV. The appellant's arguments insofar as they concerned the sole request on file can be summarised as follows:

It would not have been obvious to combine the teaching of the cited documents. There was no relationship between the technical field of glass containers and that of optical fibres. The glass materials, the

techniques for obtaining the products and the stresses in the products were completely different. Therefore nobody would have borrowed the teaching from the field of optical fibres and applied it to glass containers. If the teaching concerning optical fibres were disregarded, then the skilled person would not be led to the claimed subject-matter. With respect to the process of D1 as the closest prior art, the claimed process was more flexible and provided a better product. The additional heating of the coating material applied to the glass container led to solvent removal, reduction of the surface tension and viscosity of the coating. The appellant believed that the heating step had a levelling or smoothing effect on the coating and thus improved the properties of the product. D1 taught away from heating the coating since it listed on pages 2 and 3 all the difficulties resulting from a heating step and concluded that photocuring should be used. The skilled person would not have gone in a direction which was disclosed to be disadvantageous in D1.

V. The respondent presented inter alia the following arguments:

The process of claim 1 differed from that of D1 only by the heating step before curing. It could be seen from the examples of the patent in suit that the heating step was performed to dry the coating, ie to eliminate the solvent contained therein. D1 did not disclose the heating step but did not use a solvent either.

Furthermore, it taught that when a solvent was present, it had to be removed. As the claimed process again made use of a solvent, it was obvious to the skilled person to perform a heating step in order to remove the solvent which was added to adjust the viscosity of the coating material so as to permit an easier application thereof to the substrate. It belonged to common general

knowledge that the solvent had to be evaporated before curing in order to obtain a coating of good quality. Therefore D1 alone not only disclosed the technical problem but also suggested the solution thereto.

Furthermore, D5, which disclosed curing of the polymer system by UV irradiation, taught that said curing could be enhanced thermally. D2 taught on page 768 that removal of the water by heating at 120°C for 30-90 minutes relieved internal stress and thus led to a better coating. The skilled person would have looked at available documents concerning the coating of glass, including documents in the field of optical fibres.

#### **Reasons for the Decision**

1. Concerning the admissibility of the opposition, the Enlarged Board of Appeal decided in decision G 3/99 of 18 February 2002 (to be published in the OJ EPO) that an opposition filed in common by two or more persons, which otherwise meets the requirements of Article 99 EPC and Rules 1 and 55 EPC, is admissible on payment of a single opposition fee. Accordingly the opposition is admissible.
2. The appeal is admissible.
3. It is not disputed that amended claim 1 meets the requirements of Article 123(2) and (3) EPC. Its subject-matter is also novel with respect to the disclosure of each of the cited documents.
4. D1 represents the closest prior art. D1 discloses a method of strengthening glass bottles for preventing breakage thereof. This method comprises applying a coating material comprising a reactive compound having

two or more acryloyl or methacryloyl groups in its molecule to the glass bottles, and curing the coated glass bottles by irradiation, in particular UV-irradiation. The coating material comprises a silane coupling agent such as  $\gamma$ -aminopropyltriethoxysilane or vinyltriethoxysilane (see page 2, claim; page 4, lines 15 to 21; page 6, lines 9 to 12; page 11, lines 7 to 10 and last paragraph; pages 14 and 15, Photocurable paint III).

- 4.1 Starting from this prior art, the technical problem underlying the patent in suit can be seen in the provision of a more flexible process for strengthening glass containers.

The patent proposes to solve this problem by the claimed process which differs from that of D1 by heating the silane coupling agent and/or the coating material at a temperature of 40°C to 120°C for 10 seconds to 1 hour before the curing step. Claim 1 includes in fact both the alternatives where the coating material contains a solvent or does not. In all the examples of the patent in suit the coating material contains the active ingredients in a concentration adjusted to 40 wt% with methyl ethyl ketone, ie with an organic solvent, and the coating is dried before curing with ultraviolet irradiation. The drying step is performed in an oven at 60°C for 1 minute in examples 1 to 32. It is credible that, in the alternative where a solvent is present, the said problem of greater flexibility has been solved since it is immediately apparent considering the general knowledge that the addition of a solvent makes it easier to adjust the viscosity of the coating material and, thus, to apply it with the desired thickness to the glass. Therefore,

the board considers that the problem stated above has actually been solved by the claimed process in the alternative where the coating material comprises a solvent.

4.2 The appellant argued at the oral proceedings that the heating step further led to a better product than those of the closest prior art D1 and explained that the surface tension and viscosity of the coating were reduced by heating, thereby levelling or smoothing the applied coating. This levelling or smoothing effect would give a coating of better quality. The board observes that such an effect is, however, not described in the patent in suit as pointed out by the respondent. According to the patent, an increase of the uniformity of the coating on the glass container is achieved by the addition of a levelling agent or a surface active agent (see page 18, lines 43 to 44). The respondent also expressed doubts as to whether the heating step actually brought about a levelling of the coating. The appellant has provided no evidence or experimental report in support of this effect although he has the burden of proof in this respect. Under these circumstances, the board cannot consider the said effect or improvement for the formulation of the technical problem and the assessment of inventive step. The appellant also argued that the equipment used to carry out the claimed process was simpler than in D1. However, this argument cannot be accepted by the board since the use of additional heating equipment does not render the equipment simpler.

4.3 The process of D1 does not comprise a heating step under the claimed conditions before the curing step. To explain the invention of D1, D1 makes reference to conventional methods for forming a plastic film on the surface of glass bottles and indicates the disadvantages of these methods. The paragraph bridging



pages 2 and 3 concerns a method in which the coating material applied to the glass surface is curable at room temperature. The disadvantages of this method are, according to D1, (i) the time needed to vaporise the organic solvent and water used as the solvent, (ii) the difficulty to cool the glass when drying has been promoted by blowing warm air, and (iii) the expensive recovery or incineration of the vaporised organic solvent when an organic solvent is used. The two following paragraphs on page 3 relate to known methods in which a heat-curable coating material or a self-supporting film are applied onto the glass surface. The drawback of these two methods is the increased length of the coating line due to the necessity to increase/decrease the temperature slowly. To avoid these drawbacks, D1 proposes a method in which the glass bottle is coated with a photocurable coating material and cured by irradiation with an activating light beam, such as UV irradiation. The advantages of this method over the said conventional methods are indicated in the paragraph bridging pages 3 and 4, namely drying and curing of the film in a relatively short period of time without vaporisation of the organic solvent or water, together with no need to recover or burn off the solvent as there is no solvent vaporized, and rather short coating line in the absence of an increase in the temperature of the glass bottle. Therefore, it can be inferred from D1 that the process of D1 avoids the drawbacks of the first conventional method by using no solvent and, thus, dispensing with the heating step used to vaporise the solvent before curing. It is not indicated in D1 that the incorporation of a solvent into the coating material makes it possible to easily adjust the viscosity of the coating material, thereby resulting in a greater flexibility of the process; however, it was not disputed by the appellant that this belongs to the general knowledge of the skilled person before the

priority date (see also point 4.1 above). Therefore, the skilled person confronted with the problem stated above would have realised in view of the teaching of D1 that the incorporation of a solvent into the coating compositions of D1 would solve the problem of improving the process flexibility. It would have been obvious to the skilled person that the solvent must be removed from the coating before curing in order to obtain a coating with good properties since this was also general knowledge before the priority date. This was not disputed. Furthermore, D1 discloses the removal of the solvent by heating before the curing step when a solvent is present as already indicated above. The temperatures and the time to be used for evaporating the solvent depend in particular on the kind of solvent present in the composition and could be determined by the skilled person by simple routine experimentation. As pointed out by the appellant the skilled person was aware, in view of D1, of the drawbacks resulting from the presence of a solvent and from its removal by heating before the curing step. However, this would not have deterred the skilled person from using a solvent in the coating composition of D1 and subsequently heating the coating to remove the solvent therefrom since the problem he was confronted with was not to avoid the drawbacks due to the presence of a solvent but to improve the process flexibility. The board observes that the claimed process does not itself avoid the drawbacks due to the presence of a solvent in the coating material and its subsequent removal by heating. The claimed process in fact solves the problem of improving the process flexibility by using a solvent in the coating composition and then removing it by heating after application of the coating but without overcoming the expected drawbacks resulting from the presence of the solvent and its subsequent removal. In view of the teaching of D1, it was therefore obvious to the skilled person to use a solvent in the coating composition of

D1 and to heat the coating for removal of the solvent before the curing step in order to improve the process flexibility while simply accepting the expected drawbacks resulting from these measures.

4.4 It follows from the above that the subject-matter of claim 1 in the alternative encompassing the presence of a solvent does not meet the requirement of inventive step set out in Articles 52(1) and 56 EPC.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed

The Registrar:



P. Martorana

The Chairman:



R. Spangenberg

*H.E.*

